

PATENT

EXPRESS MAIL NO. EK220865412US

Attorney Docket No. 99-401

**WHAT IS CLAIMED IS:**

*SUBJ* 1. A system for collecting events relating to a plurality of target programs, each program running on a respective target processor, and each target processor being located on a separate system bus, the system comprising:  
5 a plurality of event collection cards, each receiving events from a respective one of the plurality of target programs, wherein each of the plurality of event collection cards and the respective one of the target programs is installed on the same system bus, and wherein each event collection card includes:  
a time stamp clock for providing a time stamp when each event is received;  
an event memory for storing the received events;  
a sync interface unit for receiving a sync signal;  
a sync control unit for synchronizing the time stamp clock to the sync signal received by the sync interface; and  
15 a collection control unit for time stamping the collected events according to the time stamp clock synchronized to the sync signal, and for storing the time stamped events in the event memory.

*SUBJ* 2. The system of claim 1, wherein the sync interface unit periodically receives the sync signal, and wherein the sync control unit periodically

synchronizes the time stamp clock by setting the time stamp clock to a preset value upon receipt of the sync signal.

3. The system of claim 2, wherein the sync control unit increments the time stamp clock to the preset value when the time stamp clock has not reached the preset value when the sync signal is received

4. The system of claim 2, wherein the sync control unit stops the time stamp clock when the time stamp clock reaches the preset value before the sync signal is received.

5. The system of claim 1, wherein one of the plurality of event collection cards operates as a master card and at least one other event collection card operates as a slave card, and wherein:

the sync control unit of the at least one slave card synchronizes the time stamp clock of the slave card to the time stamp clock of the master card.

6. The system of claim 5, wherein:  
the collection control unit receives a start request requesting that the collection control unit begin collecting events; and

5

the sync control unit determines, when the collection control unit receives the start signal, whether the event collection card is a master card or a slave card, and wherein the sync control unit transmits a sync signal to the slave card only when the event collection card is a master card.

7. The system of claim 1, wherein the plurality of event collection cards are daisy-chain connected to one another.

8. The system of claim 1, wherein the sync interface unit receives the sync signal from a time-based global positioning system.

9. The system of claim 1, wherein the sync interface unit receives the sync signal from an atomic clock.

Sub B<sup>2</sup>

10. The system of claim 1, wherein the event collection card sends the collected events to a host computer for processing, and wherein the event collection card further includes:

a bus interface unit, connected to an event collection bus, for receiving events from the target processor over the system bus, wherein the bus interface unit forwards the received events to the collection control unit over the event collection bus;

PATENT

Attorney Docket No. 99-401

EXPRESS MAIL NO. EK220865412US

*Sub B27*  
a processing unit, connected to a local bus, for sending the collected events  
to the host computer; and

10                   a bus isolation unit for allowing the event collection bus and the local bus to  
                      operate in parallel.

*Sub C1*  
11.          The system of claim 10, wherein the bus isolation unit allows the  
                      processing unit to access the event memory via the local bus and the event  
                      collection bus.

12.          The system of claim 1, wherein:  
                      the collection control unit initializes the corresponding target processor  
                      prior to collecting events by assigning an address range to the target processor,  
                      wherein the target processor uses the assigned addresses when sending events to the  
                      event collection card.

13.          The system of claim 12, wherein:  
                      the collection control unit determines an identification value by decoding  
                      the address to which the respective target processor has sent the event, wherein the  
                      identification value corresponds to the target program corresponding to the  
                      respective target processor.

5

EXPRESS MAIL NO. EK220865412US

**PATENT**  
Attorney Docket No. 99-401

14. The system of claim 13, wherein:

the collection control unit time stamps the identification value and stores the time stamped identification value in the event memory.

15. The system of claim 1, wherein the collection control unit updates a  
try count for each time stamped event stored in the event memory, wherein the  
collection card sends the collected events to a host computer for processing,  
n the event collection card further includes:

a processing unit for sending the collected events to the host computer according to the memory count.

PATENT

EXPRESS MAIL NO. EK220865412US

Attorney Docket No. 99-401

*SuBQ* 16. An apparatus for collecting computer program events, the apparatus comprising:

an event collection card for receiving the computer program events, wherein the event collection card includes:

5 a time stamp clock for providing a time stamp indicating when each event is received;

an event memory for storing the received events;

a sync interface unit for receiving a sync signal;

10 a sync control unit for synchronizing the time stamp clock to the sync signal received by the sync interface; and

a collection control unit for time stamping the collected events according to the time stamp clock synchronized to the sync signal, and for storing the time stamped events in the event memory.

*SuBQ* 17. The apparatus of claim 16, wherein the sync interface unit periodically receives the sync signal, and wherein the sync control unit periodically synchronizes the time stamp clock by setting the time stamp clock to a preset value upon receipt of the sync signal.

EXPRESS MAIL NO. EK220865412US

PATENT  
Attorney Docket No. 99-401

18. The apparatus of claim 17, wherein the sync control unit increments the time stamp clock to the preset value when the time stamp clock has not reached the preset value when the sync signal is received

19. The apparatus of claim 17, wherein the sync control unit stops the time stamp clock when the time stamp clock reaches the preset value before the sync signal is received.

20. The apparatus of claim 16, wherein the sync interface unit receives the sync signal from a time-based global positioning system.

21. The apparatus of claim 16, wherein the sync interface unit receives the sync signal from an atomic clock.

22. The apparatus of claim 16, wherein the event collection card sends the collected events to a host computer for processing, and wherein the event collection card further includes:

a bus interface unit, connected to an event collection bus, for receiving the events and forwarding the received events to the collection control unit over the event collection bus;

a processing unit, connected to a local bus, for sending the collected events to the host computer; and

10 a bus isolation unit for allowing the event collection bus and the local bus to operate in parallel.

23. The apparatus of claim 22, wherein the bus isolation unit allows the processing unit to access the event memory via the local bus and the event collection bus.

24. The apparatus of claim 16, wherein:  
the collection control unit initializes a target processor running a target program generating the events prior to collecting the events by assigning an address range to the target processor, wherein the target processor uses the assigned addresses when sending events to the event collection card.

25. The apparatus of claim 24, wherein:  
the collection control unit determines an identification value by decoding the address to which the respective target processor has sent the event, wherein the identification value corresponds to the target program corresponding to the respective target processor.

26. The apparatus of claim 25, wherein:

the collection control unit time stamps the identification value and stores the time stamped identification value in the event memory.

27. The apparatus of claim 16, wherein the collection control unit updates a memory count for each time stamped event stored in the event memory, wherein the event collection card sends the collected events to a host computer for processing, wherein the event collection card further includes:

a processing unit for sending the collected events to the host computer according to the memory count.

PATENT

Attorney Docket No. 99-401

EXPRESS MAIL NO. EK220865412US

*sub A3* / 28. In a system having a plurality of target programs, each program running on a respective target processor, and each target processor being located on a separate system bus, wherein each of a plurality of event collection cards and a respective one of the target programs are installed on the same system bus, wherein each event collection card performs a method comprising the steps of:

receiving events from the respective one of the plurality of target programs;

storing the received events in an event memory;

receiving a sync signal;

synchronizing a time stamp clock to a received sync signal;

time stamping the collected events according to the time stamp clock synchronized to the sync signal; and

storing the time stamped events in the event memory.

*sub A* / 29. The method of claim 28, wherein:

the step of receiving the sync signal further includes the substep of periodically receiving the sync signal; and

the synchronizing step further includes the substep of periodically synchronizing the time stamp clock by setting the time stamp clock to a preset value upon receipt of the sync signal.

5

SEARCHED INDEXED  
SERIALIZED FILED

30. The method of claim 29, wherein the synchronizing step further includes the substep of:

incrementing the time stamp clock to the preset value when the time stamp clock has not reached the preset value when the sync signal is received

31. The method of claim 29, wherein the synchronizing step further includes the substep of:

stopping the time stamp clock when the time stamp clock reaches the preset value before the sync signal is received.

32. The method of claim 28, wherein one of the plurality of event collection cards operates as a master card and at least one other event collection card operates as a slave card, and wherein the synchronizing step further includes the substep of:

synchronizing the time stamp clock of a slave card to the time stamp clock of the master card.

5

33. The method of claim 32, further including the steps of:

receiving a start request requesting that the event collection card begin collecting events;

5 determining, when the event collection card receives the start signal,

transmitting a sync signal to the slave card only when the event collection

card is a master card.

34. The method of claim 28, wherein the step of receiving the sync signal further includes the substep of:

receiving the sync signal from a time-based global positioning system.

35. The method of claim 28, wherein the step of receiving the sync signal includes the substep of:

receiving the sync signal from an atomic clock.

*Sub B57*

36. The method of claim 28, further including the steps of:

sending the collected events to a host computer for processing;

receiving events from the corresponding target processor over an event collection bus;

5 sending the collected events to the host computer using a local bus; and

allowing the event collection bus and the local bus to operate in parallel.

*Sub B57*

37. The method of claim 36, further comprising the step of:

initializing the corresponding target processor prior to collecting events by assigning an address range to the target processor, wherein the target processor uses the assigned addresses when sending events to the event collection card.

38. The method of claim 37, further comprising the step of:  
determining an identification value by decoding the address to which the respective target processor has sent the event, wherein the identification value corresponds to the target program corresponding to the respective target processor.

39. The method of claim 38, wherein the time stamping step further includes the substeps of:  
time stamping the identification value; and  
storing the time stamped identification value in the event memory.

Sub B7  
40. The method of claim 28, further including the steps of:  
updating a memory count for each time stamped event stored in the event memory;  
sending the collected events to a host computer according to the memory count.